SCIENCE AND INDUSTRY

ORGANIC GARDENING

MAR 24 1943
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MAR. 1943

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Compost for the Garden

By J. I. Rodale

IS it practical to run a garden exclusively with the use of compost, without the aid of the so-called chemical or artificial fertilizers? The answer is not only *yes,* but in such case you will have the finest vegetables obtainable, vegetables fit to grace the table of the most exacting gourmet.

Location of Heap

First choose a good site for the heap, preferably protected on the north, east, and west by a wall, fence, or hedge. Have it as close to the garden as possible and near your supply of water, because in dry weather you will have to water it every day. Pick out a flat location that is well drained, and one that is not near the bottom of a hill, where the rains will come shooting down. Reserve a place next to the heap where you can pile your green waste materials such as weeds, grass clippings, etc., for it is best to let such material wither awhile, before being placed in the compost heap.

Size of Heap

The size will depend on the area of your garden and the amount of material you have available for composting, but the minimum should be 5 foot square. The height, regardless of the square area is 5 feet. The maximum width in the case of large heaps should be about 12 feet wide, otherwise air will not be able to penetrate the inside. The length can be almost any size. In India, Sir Albert Howard has stated, that heaps have been made over 30 or 40 feet long. The height, however remains at 5 feet. A good size for the average small garden would be about 9 feet wide by 12 feet long.

Materials Used in Heap

It is best if you can accumulate a reserve of green waste materials to have on hand for the future. This may consist of leaves, weeds, grass clippings, corn stalks, sun-flower stalks, hedge-trimmings, seaweed, spoiled hay and straw, kitchen wastes, chaff, and any other kind of plant material you can lay hold of. In many cases you will find neighboring land growing wild in weeds. You can always get permission to cut it down. By doing so you not only obtain material for composting, but by cutting it down before the weeds go to seed, you prevent these seeds from blowing over your land.

There is much material and by-products in the industrial life of cities and towns which yields valuable organic matter for composting. Take your average large market. In the fish department there accumulates much in the way of fish cuttings, entrails, heads, etc., which is given away for the asking. This may be used as a manure substitute in the compost heap. Breweries give away what is called *brewery waste,* which consists of the hulls of grains used in making liquors, after the inside of the grains has been pressed out. This is valuable plant material. In the vegetable department at groceries and at wholesale establishments there accumulates large quantities of the green tops of vegetables. the danger here, however, is that much of this may have been treated with poison sprays in the field. I would go easy on this kind of material.

In chicken markets, much organic material is thrown out or burned at the city incinerof green material on top of the last layer of earth, then 2

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ORGANIC GARDENING

EMMAUS, PA.

Vol. 2, No. 4, March, 1943 | $2.00 a year | 25c a copy

J. I. Rodale—Editor | Sir Albert Howard, C. I. E., M. A., Associate Editor

With the Editor

LIFE is a funny proposition—and you never can tell how the statements of a true scientist will react. Take the matter of the importance of earthworms to agriculture as an example. About 1881 Charles Darwin, the world-renowned naturalist, brought out a book entitled "Vegetable Mold and Earthworms." It was a profound exposition of the results of years investigations as to the part earthworms play in nature's scheme of things and proved conclusively that without the earthworm, vegetation would degenerate mighty close to the vanishing point. Startling? Of course it was startling. No one, up to that time, had given a thought to the earthworm and the idea that worms could be of real service to agriculture had never occurred to even the most enlightened soil expert. And yet the disclosures of Charles Darwin, as far as earthworms are concerned never caused a ripple of interest. A noted writer, some years later, noted that the particular copy of the book "Vegetable Mold and Earthworms" which he obtained from a local library showed, by the marks of the librarian, that it had been taken out by readers only 14 times in the past 28 years! No, the revelations of Charles Darwin that would have meant so much for agriculture had they been recognized then at their true worth, were overshadowed by the more sensational treatise of this famous naturalist when, in his "Origin of Species" he propounded the now-famous proposition that man and monkeys originated from the same ancestral tree. What a bomb shell that was! It swept over this earth like a prairie fire. It was discussed in legislative halls, in courts of justice, in churches and around cracker barrels at every cross roads. It found proponents and opponents everywhere. It even turned friends into enemies and disrupted families. Yet, at best, it was but a theoretical proposition—it didn't mean anything, one way or the other, as far as our present lives are concerned. Where we came from—the Garden of Eden or the salt waters of the ocean—mattered little to our physical comfort but an appreciation of the status of the lowly earthworm involved the present health and physical

Rodale Press. Executive and Editorial offices, 6th and Minor Sts., Emmaus, Penna. Subscription rates 12 issues for $2.00 **ORGANIC GARDENING**, published monthly by Rodale Press, at 6th and Minor Sts., Emmaus, Penna. Entered as second class mail at the postoffice at Emmaus, Penna., under the act of March 3, 1879. Printed in U. S. A.

and mental vigor of every human being on this planet. So the "man-monkey" controversy received the spot light while the really important disclosures of this great naturalist—the disclosures regarding the earthworm—were relegated to the discard for something like fifty years. Only now is a true appreciation being had of just what the revelations of Charles Darwin regarding earthworms meant to humanity. Only now is some thought being given to the preservation and cultivation of those little wrigglers that mean, in the final analysis, the difference between a successful garden and a total failure—not only of the garden but of our health as well.

The earthworm is actually Nature's plow. It bores into the earth and makes it porous, permitting the rain to be absorbed into it as far down as six feet or more, thus checking erosion. It draws leaves and other green matter into the soil where it is used to line their burrows and also as food. Much of it decays below the surface. It brings up valuable minerals from great depths. It eats the earth and after processing it gives off castings which are the richest kind of soil conditioner available. And when the earthworm dies, its decaying body adds to the soil's fertility. Tests made by Darwin showed that this amounted to substantial amounts per acre. In one test made it was shown that earthworms in one year deposited a fifth of an inch of castings on the soil surface. Imagine, they raised the level of the soil by one fifth inch of a most rich type of top-soil, in only one year.

It is a known fact that the use of the chemical fertilizers destroys, removes or discourages earthworms. The U. S. Government Agricultural Department has stated that the use of Ammonium Sulphate, a common agricultural fertilizer, renders the soil so acid, that all earthworms disappear. On some of the high production tracts of land where large amounts of these artificials and poison sprays are used, the earthworm is found no more.

Now this is rather a discouraging thing from a health standpoint. The public is eating food raised on these "commercial" acres, which cannot possibly contain as much minerals and vitamins as that grown where the land is naturally fertile and where earthworms and humus abound. In England at certain schools children who ate food grown without the aid of "artificial" fertilizers were found to be generally healthier than other groups.

It is our intention here at the experimental farm to establish a chemical laboratory where vitamin and mineral tests will be extensively carried out to prove whether food raised in soil which is rich in humus and earthworms have more nourishing value, and to show that such soil has a richer bacteria population which is a tremendously important factor in the growing processes.

Now, other disturbing factors seem to enter the picture! I mentioned some time ago that around our farm we practically saw no frogs or toads. It is possible that the use of chemicals and poison sprays make for conditions distasteful to these creatures, yet, we know how important it is to keep the insect menace in check, and how valuable frogs and toads are for this purpose. Also when these animals die their decaying bodies enrich the soil. Their daily excretions add to the earth's store of natural organic material.

I mentioned this fact to a friend who has a country place at Quakertown, Pa. Her eyes opened wide! "Why, that makes me think," she said. "Near our house we used to hear the croaking of what seemed to be thousands of frogs. Then one year we rented 2 acres to a man who planted two acres of tomatoes, and who used plenty of chemical fertilizer. We never heard any frogs there after that." Astounding, isn't it?

Now, how about slugs and snails? As you know, a snail has a shell. A slug, you might say is a snail, minus the shell. Are they also giving a wide berth to regions where the hand of man has polluted the soil with poisonous and corrosive chemical applications? It would be a pity if they are,

because they are a vital part of nature's beneficient cycle. According to a recent issue of Nature Magazine these tiny creatures secrete an organic substance across their path of travel which I am sure decays and helps the soil. Let me give a few excerpts:

"Slugs make rope swings in which to do their love making. . . . In our gardens we sometimes find silvery, winding roads that weave in and out of the vegetation, and even upon the plants themselves. These shining ways are the blazed trails of our common snails and slugs. Unlike our pavements, theirs are sticky and shiny, made from a mucous secretion discharged from the slime ducts just below their mouths. On this roadway they glide forward. . . . ."

This is a live, organic substance which eventually turns to humus and contributes its tiny bit towards Nature's reserve in the soil. And here again, where there are many snails, and a normal amount of deaths occur, the fertility value of their bodies to the soil is no little amount because their shells contain much calcium carbonate (lime) which we all know is highly valuable.

I have not seen a single snail in the gardens surround- This place had been badly run down when we secured it about 2 years ago. As we build ing our home on the farm. it up organically it will be interesting to note whether snails, slugs, frogs, toads, etc., will again return.

It is a sombre picture and no doubt as time goes on we will find more of the missing pieces in the jig-saw pattern of the rape of the earth.

J. I. Rodale

The Control of Plant Diseases

By Sir Albert Howard, C. I. E.

AS Great Britain and other parts of the Empire become compost-minded and more and more attention is being paid to Nature's law of return, an interesting sidelight on the control of plant diseases is developing which is certain before very long to help in bringing the imposing edifice of state-aided agricultural teaching and research crashing to the earth. The principles on which the various official agencies now mainly rely for the control of plant diseases are threefold: (1) Areas are protected from new pests from overseas by various quarantine measures; (2) The parasites themselves are made to undergo an intensive strafing by fire and sword—in the form of burning, and lethal poison sprays and powders, and (3) The production of a constant stream of disease-resisting varieties. In spite of all this and other measures, however, plant diseases continue to flourish; the old ones constantly reappear and new ones are discovered. The disease-resistant varieties only enjoy a brief period of popularity and soon begin to retreat before the pests. Obviously there is something wrong somewhere.

This something is now coming to light. The application to the soil of freshly prepared humus is throwing a flood of light on the meaning, the cause, and also the prevention

of plant diseases. The appearance of disease is Nature's protest that all is not well with the soil, because when Mother Earth manages land the birthright of every plant and every animal is health, not disease. The cause of plant diseases is always bad farming or gardening, often aggravated by trying to improve on Nature by the use of a substitution factor for properly made humus in the shape of artificial manures. The only sound method of preventing plant diseases is the restoration of soil fertility.

All this does not merely interest gardeners and farmers. It is the concern of everybody, because the foundation of the public health system of tomorrow is a fertile soil. To get the soil of the island in which we are living fertile so that the population can enter into their birthright—robust health—public opinion, and in particular urban opinion, has got to be interested, so that it can take effective and resolute action, whereby the various vested interests and their scientific and administrative Quislings can be swept into the dustbin together.

Everybody who has a garden can help in this great food reform. They can learn how to make humus and then get their small area of land into a fertile condition. The result will be more and better vegetables and the disappearance of plant pests of all kinds—insect, fungous and virus.

Correspondents all over this country are now reporting their results on the control of plant diseases. A very interesting example will be found in the following letter from Mr. H. J. Massingham, Reddings, Long Crendon, Buckinghamshire, dated December 22nd, 1942, which caused me to write this note. Here it is:—

"I am very glad to hear from you again, especially when it contains such extremely interesting enclosures. I am thinking of doing a book on gardening after I have finished my present one. I shall therefore insert your paper—"Some Gardening Lessons from the Orient"—from *The Gardeners' Chronicle* with my notes, as I shall have plenty to say about composting and my own experiments on a very modest scale. But there is no doubt whatever that it is superb stuff and enormously alters the *taste* of vegetables, which is as good a criterion as any. And your paper will be fine for quoting from. I have also entirely succeeded in my garden in eliminating disease. Before I used it every plot all over the garden was affected. I had virus on my raspberries, big bud on my black-currants, rust on my snapdragons and sweet william and the most awful black spot on my roses, not to mention *Botrytis* on my lillies. Now I have got rid of the lot except about 5 yards of one of the rose beds which still has black spot, chiefly, I think, owing to bad drainage there. But rust, *Botrytis*, big bud, virus, have all gone and I used no sprays whatever."

Obviously the experiment station workers on vegetable pathology are on the wrong tack. They should at once leave their comfortable laboratories and libraries, take up a piece of land, learn all about compost and its manufacture, and then watch how Nature, the old nurse, looks after the health of crops when we faithfully comply with her great law of return. They could make amends for having misled us for so long by converting most of the literature of plant diseases into compost.

●

Grain Sprouts

Many of the fresh green vegetables we are wont to cook will not be available. Suggested as a possible substitute, are wheat sprouts. All grain sprouts are a rich source of Vitamin C, and inexpensive, too.

The wheat is germinated on a wire shelf covered with a moist cloth and placed over water in a shallow, covered vessel. At room temperatures the sprouts are about one inch long and ready to eat in one week.—*Hospital Topics.*

EDITOR'S NOTE:—Sprouting in compost would be much healthier.

How Did Your Garden Grow?

By Paul Keene

Reprinted from "The Decentralist," publication of the School for Living, Suffern, N. Y.

THIS summer the School of Living carried out a garden program of considerable interest to our students, visitors and community members. We wanted to experiment and to demonstrate what could be done with a given piece of land using different cultural methods. To this end we laid out five gardens, all on the same one-third acre. In all of them we used the bio-dynamic method of organic gardening in which no poisonous chemical sprays or dusts are used. If readers wish further information on this method we will be glad to send it to them.

The first garden is the 30x 30 small-family garden, as described in *Grow a Garden,* by E. Pfeiffer and E. Reise. Dr. Pfeiffer is head of the Bio-dynamic Farming and Gardening Association of America. This garden is divided very interestingly into fourteen beds, each about 14x3 feet. In these beds various combinations of vegtables and herbs are planted in such a way that they present a pleasing appearance and also exercise a beneficial effect upon one another. For example, peas and carrots grew in one bed, celery and leeks in another and beets and kohl rabi in a third. Under favorable conditions, with proper care, it is claimed that this small home g a r d e n will supply enough vegetables for a family of three to four persons. We are finding it most satisfactory and recommend it to anyone. The raised-up bed system seems to be best for a heavy, poorly-drained s o i l such as we have. We favor this garden because it is varied, diversified, integrated, complete. It seems to possess the same type of "well-rounded personality" as far as gardens grow that we feel homesteading life can provide in human terms for the individual.

In this same book we find described the Chinese garden, which is our second one. It represents the ultimate in space conservation. In a plot about 10x14 feet we have piled up the earth into three parallel mounds, each about 2½ feet high, with two troughs between the three. Making use of the vertical factor by planting on the sides of each mounds in rows going completely around it, we find that we naturally get more rows than one would on a plane surface of equal base. On each mound a row is planted along the top. Then two rows are planted on the sides between the top and bottom, and one row is planted in each trough. The planting is arranged so there is no harmful overlapping or shading. It is not suited to tall or heavy vegetables like corn, tomatoes, etc., but it works very well for beets, carrots, radishes, spinach, lettuce, parsley, etc. As each row is taken out another is planted in its place, so that all summer long the mounds are covered with green vegetables. In very dry weather it would doubtless do beter with some watering, but this summer this was not necesary.

The third garden, described in *Big Crops From Little Gardens,* by A. B. Ross, is a Three-story Garden. During World War I this plan was worked out by Mr. Ross in connection with the Department of Agriculture to save garden space. It is claimed that from a given p i e c e of land as much as t h r e e times the usual amount of produce can be grown by this method, with no harm to the sonl. Taking a lesson from the ubiquitous weed, we plant much closer than usual. By careful planning we can plant prior crops, main crops and

follow crops all in the same row. We make use of the vertical again by training pole beans to ten foot poles (the third story) and tomatoes to six foot poles (the second story). The rows run east and west to allow more sunlight to get between the corn rows. Careful account is taken of shadows cast to see that everything has enough sunlight. Our garden is 40x25 feet and we find that it would provide very liberally for a small family. The plan can be adjusted to fit any size plot. If soil fertility is properly maintained, this is one of the best practical plans that we know for getting the utmost from a given piece of land.

Fourth is the Chinese cucumber garden. The Chinese make a trellis or "tepee" of tall poles and plant cucumbers around each pole. As the vines grow they are trained to climb up the trelis instead of spreading on the ground. The cucumbers hang down inside the "tepee". About four times as many cucumbers can be raised in a given area by this method since again the vertical is used instead of the horizontal. Our garden is proving quite successful and it is a most interesting sight. The inside of the "tepee" would make any cucumber-lover's mouth water!

Fifth and last is the regular garden. This is planted in and around the experimental gardens to fill up the remaining spaces. Here too we used experimental methods. For example, in planting potatoes we dug a trench about a foot deep, heaping the earth between the rows. In the trench we mixed compost with loose earth and then put in the potatoes and covered them. As they grew up above the surface we covered the stems with the earth from between the rows until the surface of the patch was level again. This not only gave more loose soil for the potatoes to grow in but helped keep the weeds down.

In general the gardens were not as productive proportionally as the previous year because of the almost incessant heavy rains to which we were subjected. Root crops suffered badly. We are highly pleased, however, with the results of our experiments and feel that we have learned much of value.

Raising Chickens By Feeding Earthworms

By J. I. Rodale

A NEW idea has come from the Pacific coast which seems to fit perfectly into the organic scheme of things on the farm—raising chickens by feeding them earthworms. The late Dr. George Sheffield Oliver is the originator of it. It is now being sponsored by the California Earthworm Farms who are soon to put out a book describing the method.

Before the chicken was domesticated, it laid probably not over 20 eggs a year, in the wild state. Then man came upon the scene and by picking out and gradually breeding only the better layers, and feeding them high-pressure mashes, we now have chickens that lay over 300 eggs a year. The question is, how fit are these eggs for human consumption, and also how fit is the meat of these layers as food. When our experimental laboratories at the Rodale farm begins to function after the war, perhaps we will get a scientific answer. Some day some benefactor of the human race is going to start to "unbreed" these high-powered chickens. By a method of breeding only the poorer layers, feding them properly, and working backwards he might

finally get a flock that averages only 40 to 50 eggs a year. Will those eggs be healthier as a food? Will the meat of those chickens taste better and be healthier from a mineral and vitamin standpoint?

Be that as it may, this earthworm idea is well worth trying.

Under the roosts a pit is dug let us say, three feet deep, and extending out on all sides of the roost about three feet. If your roosts measure three by five feet then the pit would be nine by eleven feet. You line the bottom and sides of the pit with wood so that the worms do not get away. Your regular litter covers over the outer portion of this pit area, extending over the outside of the roosts.

This pit is filled with rich earth generously mixed with compost. And it is necessary to put quite a large amount of live earthworms in it. Dr. Oliver in his book has mentioned 50,000 earthworms but this must be a typographical error. Here at Rodale Farms, this spring we will start with probably two thousand earthworms.

Now, the droppings from the roosts go into the earthworm pit and are consumed by the earthworms who multiply prolifically. That portion of the top of the pit which is directly under the roosts is covered with a wire netting so that the chickens can't get into it, but as they multiply, a great many of them will work their way into the outer three foot area around the roosts where the chickens will be able to pick some of them off. They will no doubt scratch vigorously in the litter to get at the earthworms underneath and that is important as exercise for them. The pit must be kept very moist.

In corresponding with Miss Leasure of the California Earthworm Farms, she suggested that as a start, instead of digging a pit, the earthworms may be placed in a flat case of wood under the roost, perhaps 6 inches or one foot deep and extending out on all sides from the roosts. It will be a matter of experimentation and we will have much to report as the months go by. While it is nothing more than an experiment we feel the results will be worthwhile.

In addition to feeding earthworms, Dr. Oliver suggested feeding sprouted grain, which we will describe below. The advantages of feeding earthworms and sprouted grain, according to Dr. Oliver are:

1. Reduce the feed bill about 50 per cent.
2. Reduce the cost of egg production about 50 per cent.
3. Reduce the poultry mortality rate appreciably.
4. Reduce anatomical disorders in poultry.
5. Reduce the poultryman's labor appreciably.
6. Increase the average longevity of fowls about 50 per cent.
7. Produce more fertile eggs.
8. Produce better meat birds.
9. Eliminate "bare backs" or nearly featherless birds.
10. Eliminate henhouse odors and cleaning.
11. Eliminate the feeding of meat.

The intensive range may be prepared in flat wooden boxes or in wash basins. According to Doctor Oliver the trays are filled with earthworm castings, peat moss or some equivalent and grain. When the grain sprouts the entire contents, sprouts and all are dumped out and placed within reach of the birds. The beginner who does not have earthworm castings could sprout the grain in pure compost or in a mixture of rich soil and compost, half and half. Grain sprouts are more alive than grain seeds. In the process of growing certain elements are set into being which the seed alone does not contain. It is advisable also to let chickens run on grass. We have thus far heard from two persons who have had experience in the feeding of earthworms to chickens. Mr. R. W. Barcus of Rush Run, Ohio writes:

"In the fall of 1938 we purchased several hundred baby chicks. We purchased the best chicks we could find from old reliable hatcheries. However, we lost 50% of these chicks

before they were half grown. They were subject to about every possible chicken ailment, from big liver to tumors. This loss put us out of the poultry business for that year. Now, naturally, we tried to find out what our trouble was. We had raised these chicks in battery brooders until they were about ten weeks old and then put them on a good dry floor with a litter of sawdust. We figured, at the time, that our loss was caused by this sawdust litter.

"This last year, however, we changed our system. We followed more natural lines and our losses were only about four per cent instead of fifty.

And that four percent was caused, in our opinion, by conditions in our electric brooder during the first week. Our records show that we never lost a single pullet and they started to lay within four months and 11 days after their birth. What caused this difference in mortality? The answer is easy—proper feeding. Not the highly advertised chicken foods—not the vitamin doped meal or the fancy char-coal combinations of de luxe poultry feeds. No, we went back to nature—to first principles. We saw to it that these chicks had plenty of earthworms and sprouted grain. We gave them live food—food that enabled their little bodies to become so strong that they successfully came through all the hundred and one ailments that decimate the average poultry house."

The next statement is from a newspaper clipping telling of the experiences of Mrs. Anne Warner and her daughter, Bernice of Worthington, Ohio. It reads:

"The Warners, mother and daughter, are branching into a new line or earthworms . . . the poultry house. Mrs. Warner was a farmer from way back and had to be shown. For lack of space for chickens, they went to their friend, Miss Peggy Linn, of near Delaware, Ohio. True, Peggy had less yard space than the Warners, but she had a garage and enough room to attach a small extension.

"Last fall, she started a master-bed for the Soilution worms. Late in March, she bought 23 baby white Leghorns that had been hatched on the 15th of that month, and housed them in the small extension of the garage. Within a week, she began feeding intensive range from the trays that had been sprouted in the heated garage. In mid-winter, cooped in their small enclosure, they were getting green vital food which the lucky hen would get in midsummer after an extra amount of scratching in a newly ploughed field.

"On the last day of July, exactly 4½ months after hatching, Peggy gathered the first eggs from the flock. She checked the Ohio State University Agricultural Extension Service and found that 5¼ months was the usual beginning of the laying period.

"Forcing early laying is no agricultural feat, but the result is small eggs. Within 10 days after Peggy's flock took to the laying nests, the eggs had reached normal size. Since then, there hasn't been a bantam egg in the lot. In August, her flock of 22 hens produced exactly 200 eggs. In the 27 days of September, she gathered 410, an average of over 15 eggs per day.

"They've become pets now and she wouldn't slaughter one if she were starving. No one would question the health of her flock. She hasn't lost a chick, they're full feathered and red of comb and she has yet to find that first tiny louse crawling along the roosting rails.

"The master-bed not only provides loam castings for the sprouting tray but loam and burrowing worms for the shrubbery of her yard."

(Editor's Note) — This is a new idea and must be approached with caution. Our suggestion is that it be tried only on a small experimental scale at first.

The History of the Indore Method of Composting

By Sir Albert Howard, C. I. E.

A LITTLE more than ten years have passed since a detailed account of the Indore method of composting appeared in book form under the title—*The Waste Products of Agriculture: Their Utilization as Humus.* This book was written to assist the cotton cultivators of India who provided a large portion of the funds needed for the foundation and maintenance of the Institute of Plant Industry at Indore in Central India at which this method of converting vegetable and animal wastes into humus was devised, tested on the local cotton crop and shown by large-scale trials to be the basis of any permanent and effective system of cotton growing.

The response of the cotton industry to the Indore process was interesting and proved to be typical of the reception which awaited this method of maintaining soil fertility.

A number of cotton growers in the Punjab, including Colonel (now Sir Edward) Hearle Cole, C. B., C. M. G., at once adopted the process and proceeded to convert all the wastes on which they could lay their hands into humus. They have continued to do so and are constantly looking out for new sources of vegetable wastes to improve the annual output, because humus has not only increased the yield, but also improved the fibre. The great plantation industries—coffee, tea, sugar, maize, sisal, tobacco, fruit and so forth—soon took up composting and have not relaxed their efforts. The live wires among the gardeners, vegetables, fruit and hop growers in Great Britain, as well as a few of the farmers have followed suit. The reader interested will find full details of what has been accomplished in *An Agricultural Testament* (Oxford University Press, 1941) and in the issues of *The News Letter on Compost.* (published by the County Palatine of Chester Local Medical and Panel Committees, Holmes Chapel, Cheshire, England). In New Zealand the progress that is being made is recorded in *The Compost Club Magazine* (P. O. Box 1303, Auckland, N. Z.) and in the United States in a new monthly journal entitled *Organic Gardening* (published by the Rodale Press at Emmaus, Pa. In South Africa, a country rapidly becoming compost-minded, the revolution in progress in crop production can be followed in *The Farmer's Weekly* (published in Bloemfontein) of the last ten years.

The first reaction of the experiment station workers on cotton to the regular provision of humus for their crop is a very different story. On the whole it was distinctly hostile, largely because it called in question the soundness of the two main lines of work on cotton—the improvement of the yield and quality of the fibre by plant breeding methods and the control of cotton diseases. If the claims of humus and soil fertility proved to be well founded, it would be necessary to get the land in good heart first of all and to maintain its fertility before even attempting to improve the variety or to study the pests whose depredations would probably turn out to be nothing but a result of impoverished soil. All work on chemical fertilizers would therefore have to be postponed till the full effects of a fertile soil had been ascertained. The manufacture of humus might therefore prove to be revolutionary and a danger to a research organization based on the application of the separate science to a complex and many-sided biological problem like the production of cotton.

The research workers on other crops all over the Empire took a similar view and were naturally supported and sustained in their opposition by vested interests like the pur-

veyors of artificial manures and poison sprays, who were anxious to preserve and even extend a profitable business. It has been said that even the principle of gravitation would have had a hard row to hoe, had it in any way stood in the way of the pursuit of profit and the operations of big business.

But the grounds on which the vested interests in research and trading assailed the Indore Process have lately undergone an interesting set of changes.

At first the line was taken that the claims of humus had been put forward without the support of small plots, and lacked what has been aptly described as "the fastidious approval of the higher mathematics." These objections broke down when the large-scale trials proved to be more striking and financially more profitable than was originally claimed. In face of the one unanswerable argument—success—the reproach of the absence of that statistical evidence provided by small pocket-handkerchiefs of land made no impression.

Then the pathologists in Great Britain entered the fray and attempted to make use of the fear of the parasite to deter the growers of hops, fruit, vegetables, and other crops from taking up the process. It was emphatically stated by the entomologists and myeologists that noxious insects and fungi would be certain to survive the compost heap and that the Indore Process would lead to the spread of disease and the virtual elimination of the crops to which the humus was applied. When Mr. A. R. Wills at Romsey in Hampshire demolished these fears by composting the haulms of three acres of tomatoes attacked by the wilt fungus, by applying the humus to the soil of the same houses and then raising a fine crop of tomatoes completely free from wilt, the bottom fell out of the pathologists' case. This pioneering work was followed by many other examples in which composted vegetable wastes, yielded by plants attacked by insect, fungous and even virus diseases, gave rise in all cases to perfectly healthy crops. The pathological assault has everywhere proved a dismal failure. But it has unexpectedly acted as a boomerang against the critics by drawing attention to the urgent need for all specialist recommendations addressed to the farmer to be held over until they have been tested on a practical scale. The laboratory workers must take their own advice before offering it to other people, otherwise they are almost certain to stultify themselves.

Finally the opponents of the Indore Process in this country played their last card —the absence of sufficient vegetable wastes to make enough compost to go round. This objection was soon traversed by an obvious development of the grow-more-food campaign, which was based on the ploughing up of grassland. The increased area under straw crops naturally resulted in vast quantities of surplus straw which enable all the urine and dung of our live stock to be used in humus manufacture. The live wires among the farmers are now busy devising simple means of making the maximum possible quantity of humus so as to maintain the fertility of the fields on which not only our war-time food supply depends, but the future welfare of our soil as well.

While these battles with the laboratory workers were in progress a number of the more forward-looking members of the Agricultural Departments, whose work dealt with the practical side of the subject, began to make compost and to ascertain for themselves its beneficial effects on the crop. Some of them, notably in Africa, began to break new ground and to obtain some striking results. In these developments two pieces of work stand out: (1) that of Captain Timson in South Rhodesia on the prevention by means of compost of the witchweed trouble in maize and the eelworm disease of potatoes, and (2) that of Mr. J. P. J. van Vuren on the utilization of the wastes of the towns and cities of the Union of South Africa.

One by one the African departments of agriculture have

become compost-minded and are now actively engaged in getting the Indore process taken up. These results and those of many other workers, which have amply confirmed those obtained by the plantation industries all over the world have finally silenced the critics. The Indore Process has made good.

Constructive work has not been confined to agriculture proper. The pioneers in medicine and public health have broken new ground, full of promise for the future. Two milestones have been firmly planted on the road leading to the public health system of tomorrow. In 1939 the County Palatine of Chester Local Medical and Panel Committees formulated their *Medical Testament.* (Supplement to the *British Medical Journal,* April 15th, 1939, p. 1106). In Malaya Dr. J. W. Scharff, Chief Health Officer of Singapore, demonstrated on his labor force and their families the health-giving effects of fresh vegetables grown on soil nourished with humus made from urban and garden wastes. (*Compost News Letter* No. 4, 1942.)

If I were asked at this moment to sum up the significance of soil fertility all over the world, I should reply:—A fertile soil means h e a l t h y crops, healthy live stock, and last, but not least, healthy human beings. It follows from this that the maintenance of soil fertility by means of humus is a universal concern.

This estimate of the status of humus in agriculture has recently been supported in an interesting way. The artificial manure interests are now altering their approach, and, so to say, beginning to adopt humus with, however, two reservations, namely, (1) humus must be supplemented by artificials, if the best results are to be obtained, and (2) chemical activators, like sulphate of ammonia, or calcium cyanamide, should be used whenever animal residues are difficult to come by.

While it is true that both these proposals, in the present state of agriculture all over the world, might be excused by the exigencies of the present war, when still more produce, however deficient it may be in quality and nutritive value, is urgently needed, nevertheless any serious proposal to introduce an artificial factor into humus manufacture is inherently unsound and must be contested at all costs. This will not prove a difficult task.

Practical experience has already shown that the proposed combination of humus and artificials is inadmissable. It leads to disaster in two directions: (1) the variety s o o n loses the power to reproduce itself—in other words, it runs out, and (2) the crop after a few generations is unable to resist disease. Two crops—the vine and sugar cane,—which have been cultivated for hundreds of years supply the evidence. In the Orient these two crops, as grown by the cultivators, are always manured with farm yard manure: artificials are unknown. There has been no change in the varieties grown for many centuries: they are to all intents and purposes eternal. But in the West, where the manuring is for the most part by means of artificials, the story is a very different one. In both crops the varieties are constantly running out and plant breeders are called upon to produce a never-ending stream of new kinds. The use of artificials therefore destroys the power of both these crops to reproduce themselves. The reactions of both these crops to diseases in the East and in the West is closely parallel to their behaviour as regards the power of reproduction. In the Orient there is remarkable little disease: in the Occident the ravages of insect, fungous and virus diseases in the sugar plantations and vineyards are notorious. The use of farm yard manure in the East confers a high degree of disease resistance: artificials in the West lead to a never-ending tale of disease.

Many similar examples can be quoted. Nature's verdict on the effectiveness of the combination of humus and artificials is invariably adverse.

The substitution of chemical activators like sulphate of ammonia for animal manure in making compost was long

ago tried and found wanting. While the Indore method was being originally worked out in Central India large-scale comparisons were made between animal manure and chemical activators. Humus formation was always much more rapid and satisfactory when urine and dung were used: the crop always showed a distinct preference for humus made with animal wastes.

The running out of the variety, as well as the vast array of insect, fungous and virus diseases, will therefore speedily relegate the intrusion of artificials in composting to the lumber room of exploded ideas. The reason is this. The nutrition of the fungi and bacteria which convert vegetable wastes into humus involves a great deal more than the provision of so much nitrogen phosphate or potash. The drainage of the cells and glands of the animal body are needed to nourish the active agents (fungi and bacteria) in humus manufacture and to transmit by means of the mycorrhizal association the principle (on which the permanence of the variety, resistance to disease, and quality depend) from soil to crop and then to the animal (including man), and back again to the soil. The wheel of life does not work properly unless this circulation of high-quality protein takes place.

Nature therefore can be relied on to register an adverse verdict on the intrusion of the NPK (Nitrogen, Phosphorous, Potash) mentality into the humus field. As her judgment is delivered, the downfall of the artificial manure industry will begin, as will the reform of agricultural teaching and research. What is needed now to accelerate this movement are more large-scale comparisons between real organic farming on the one hand, and NPK agriculture on the other. The pioneers in organic farming and gardening have no doubt about what will happen.

Postscript.

The supreme importance of the effective circulation of protein in Nature in the public health system of tomorrow has been emphasized of late in connection with the discussion which have taken place on our daily bread. The present position is this. To enable the milling industry to add some five to seven and a half per cent of water to flour, and to market the added water as flour, most of the germ of the wheat has to be removed, otherwise the moistened flour will not keep. This practice deprives the population of a vital food factor and is one of the reasons why we are producing a C3 nation. An unique opportunity of putting this matter right arose when England was blockaded and the saving of shipping space became an urgent question. At least fifteen per cent of shipping space could have been saved by putting real whole wheat flour on the market. At the same time five additional results could have been achieved:

(1) A large amount of the machinery in our roller mills could have been scrapped and devoted to the manufacture of munitions of war;

(2) A considerable saving in fuel could have been achieved by the simplified method of flour making;

(3) The health and efficiency of all engaged in the war effort could have been markedly improved;

(4) One of the greatest food reforms possible in this country could have been quickly effected, and

(5) The vested interests who have been profiting at the expense of posterity could have been taught the limits of their power.

Unfortunately a great opportunity has been missed, due to two obvious weaknesses in our present system of administration. The scientific advisers of the Ministry of Food have lost touch with the pioneers in their own subject —nutrition. The war has not produced enough statesmen of the calibre needed to utilize the present emergency to synthesize two great objects—the tuning up of the war effort, and the making of this island ready to receive her children.

Hints for the Victory Gardener

CABBAGE

This is the fourth of a series of articles by this author dealing with the cultivation of ordinary vegetables.

By Roger W. Smith

SINCE the beginning of recorded history the cabbage has been a popular and important item in the diet of mankind. Today, because of its valuable vitamin and mineral-salt content, it still ocupies an essential place in every Victory garden.

There are about a thousand varieties of cabbage under cultivation, from the Channel Island cabbage—a leafy type that frequently grows more than ten feet tall—to strains like the Flat Dutch which produces heads weighing over ten pounds each and the dainty little early Wakefields.

Fortunately the cabbage is not exacting as to the type of soil in which it grows. It demands only that this be a rich, well-drained, friable loam, that it contain plenty of fertile humus. The well-made compost heap offers an ideal source from which necessary humus may be obtained.

Success with cabbages largely depends upon maintaining rapid growth. Cabbages are by nature gross feeders and for quick growth plenty of the ready-to-use plant food found in compost humus is essential. This material also has a very beneficial effect upon the physical consistency of the soil itself.

If you find it necessary to break in a new piece of ground for growing cabbages and to dig under the grass and weeds growing upon it, you will find that it is very good practice to give the area a generous application of ground limestone—about five hundred pounds of calcium limestone for a quarter acre. Cabbages respond readily to the replacement of the natural limestone which has usually been lost in land under cultivation. This is natural because wild cabbage, the ancient parent type of all cultivated cabbages, thrives upon the chalk cliffs and limestone bluffs of Western Europe.

Cabbages flourish in cool, moist weather. They can be divided into Early, Midseason, and Late types. You will find that to supply the average family it is convenient to plant for about fifty early cabbage plants and about two hundred late or storage ones. To grow these requires between four hundred and five hundred feet of row.

It is very economical to use the space occupied by early cabbage, say Early Jersey Wakefield (sixty-five days to maturity) or Golden Acre (sixty-three days to maturity), by planting another crop after the cabbages have been harvested. This might well be spinach or kale seeded directly into the garden and grown for Fall use.

In the latter part of February seed for early cabbage can be started in the house. A simple method is to secure two or three wooden trays about three inches deep and fill them with screened compost humus. The trays should have adequate drainage. The seed, if used unsprouted, should be sown half an inch deep, fairly close together, in rows about two inches apart.

The trays should be watered by being immersed in an inch of starter solution until the surface of the seed bed shows signs of becoming damp. This starter solution is an essential element in the production of sturdy plants. An easy way to make it is to put several bushels of mature compost humus in a barrel or other container and pour enough water over it to cover it. After being alowed to stand over night the resulting solution is drawn off. This is the starter solution. It is rich in easily soluble plant food obtained from the humus. Experi-

ments have shown that seeds sprout and grow more than twice as well when watered with this solution instead of ordinary water. More water may be poured into the container to form more starter solution.

One packet of good cabage seed should produce about two hundred and fifty plants, one ounce about two thousand. Good seed is reasonably priced and you will find that it pays to buy only seed of strong, d i s e a s e resistant strains. Seed not used may be saved and if properly stored, will remain usable for four or five years.

As soon as the seedlings appear the trays should be placed where they will receive the maximum amount of sunlight. They should be carefully bottom-watered with the starter solution whenever necessary.

The young plants should be moved to the garden when they are about four and a half inches tall. This is usually about the middle of April.

After the garden has been well tilled, you will find that an easy way to prepare the place where the young cabbages are to grow is to hoe a trench about two feet wide and a foot and a half deep where the first row of plants is to stand. Use a guide line to keep the trench straight. This trench should be filled with compost humus and firmed.

Holes should then be made about twenty inches apart using a dibber or the end of a broom handle. Care should be taken to see that these holes are deep enough to receive the entire root of the young plant without doubling it.

In moving the young plants you will find it best to help them retain as much earth around their roots as possible. Keep all roots moist with the starter solution while the plants are being moved.

Each young plant should be carefully placed in the hole prepared for it so that it rests a little deeper in the ground than it did before it was moved. The hole should then be filled with the starter solution. When this has settled the surrounding humus should be packed around the roots and firmed.

Careful watering with the starter solution will cause quicker and more complete contact between roots and humus and aid in preventing undue wilting. The natural plant food contained in the solution is easily available to the young plants and has a tremendous influence upon their satisfactory early growth. Tests have shown that seedlings supplied with this solution grew three times as fast as those supplied with ordinary water.

Because early cabbages are often set out while the ground is inclined to be cold, you will find that good results follow running a shallow trench between the rows to secure efficient drainage and thus helping the ground to warm up. The rows should be about twenty-six inches apart.

The plants should be cultivated to keep down weeds and when they are well established you will find it very beneficial to mulch them with a couple of inches of compost humus. This protects the roots and aids in keeping the growth of the plant firm and at a natural rate without causing such excessive blown-up growth that the heads fail to form at all or, if they do form, to burst open.

In general, midseason cabbage is grown in precisely the same way as early cabbage. It differs from the early types chiefly in length of time from setting out of the plant until m a t u r i t y. All-head takes eighty days to maturity and All-seasons t a k e s eighty-five days. Midseason cabage also has considerable tolerance for summer temperatures.

Late or storage cabbage—Wisconsin Hollander a n d Danish Ballhead (both a hundred and twenty days to mat urity) for examples—differ from early cabbage in that they can be sown in an open seed bed about the middle of May. The young plants are set out at the end of June or the beginning of July.

It is very good practice to arrange the transplanting so that it takes place late in the day. The young plants will then have the advantage of many hours of coolness before they are subject to full sun-

shine. If necessary they may be protected against direct sunshine for a day or two by inverted baskets or some similar method. They should be watered liberally and as often as necessary with the starter solution.

For good growth rows of late cabbage should be thirty inches apart and the plants eighteen inches apart in the rows.

Because late cabbages are set out well along in the summer they can be planted on ground from which early potatoes, peas, lettuce, radishes, etc., have been harvested. This is an important economy of space. Even so you will find it best not to hurry the planting of late cabbages for if the heads reach maturity before the arrival of cool fall weather they are apt to crack open badly. If you are skillful you can gauge their growth so that the heads mature about the time of the first light frosts. A slight freezing has the effect of curing the heads making them better fitted for storage and of better flavor.

If you have used clean seed, grown in a clean seed bed, and the plants developed in humus rich soil, these plants should be healthy and very resistant to plant disease.

You will find it worth remembering that plant disease most commonly attacks the weaker plants. This is also largely true of insect pests. It is as if Nature sought to improve each strain by selecting and destroying the weak growing specimens.

Cabbage in the wild state is found growing in rocky, coastal areas usually so near the sea that the air in which it grows is humid with a salt-sea haze. These wild cabbages suffer little from attacks by insect pests.

Curiously enough you will find that dampening of cabbage plants with a saturated solution of ordinary water and common salt will greatly aid in keeping the plants free from damaging insects. Young cabbage plants are sometimes dusted with dry salt for the same reason.

However, if you know that the cabbage root maggot infests your locality it might be a good plan to protect the seedling cabbages against them. This is effectively done by covering the seed bed with cheese cloth tacked to the wooden curb surrounding the seed bed, to prevent the entrance of the egg-laying fly.

Late cabbage may be safely left in the garden until after the first fall frosts arrive. It will not suffer injury even though it stands for a day or two in frozen ground.

As you know, an essential part of every Victory garden program should be the careful storing away of home grown products for use during the winter months. This conservation is the more essential because cabbages are a particularly rich source of the vitamins B and C. In addition to this the green, outer leaves, which are often discarded, are rich in vitamin A.

For heat or fuel value cabbage compares favorably with tomatoes and peppers. You will remember that these food values are true only when the plants are grown under proper conditions using natural humus.

It has been shown by tests that it is quite possible to produce what appeared to be normal vegetables that were sadly lacking in flavor and food value. The growth of these vegetables had been blown-up by the use of chemical fertilizers.

For good storage, cabbage should be kept at a temperature of thirty-two to forty degrees Fahrenheit with a relative humidity of between ninety and ninety-five per cent. The rate of decay approximately doubles if the temperature is raised to fifty degrees Fahrenheit. Breakdown is also greatly increased by excessive dryness.

This simply means that the cabbages should be stored in a moist place at a temperature slightly above freezing. And you will find that the task of properly storing some two hundred head of late cabbage is easily accomplished with the rough materials usually found around a Victory garden.

About the most satisfactory method is to dig a shallow trench about six feet long in

a well drained place. Pull enough cabbages, roots and all, to fill this trench if planted side by side. Cover the roots by digging another trench close to and parallel with the first one. In the second trench plant another row of pulled cabbages. Continue this until all the cabbages to be stored have been planted.

A curb about two feet high should then be constructed around this bed of replanted cabbages. You will find that this is best done by driving a number of stakes into the ground the required height to mark its border. Rough boards or poles can be placed against these stakes.

Earth should be banked up against the outside of this enclosure. Poles, branches, or boards are laid a foot or so apart across the bed, their ends resting on the banked sides. Straw, brush, corn-fodder, or similar material should be piled over the whole bed to form a heap about five feet high at its peak.

In this shelter the cabbages will remain to be cut as needed, and you will find that in the Spring the remaining stumps will grow after the covering has been removed. These stumps will provide a plentiful supply of early greens for family use.

During the long winter months while the stored cabbages rest under a layer of snow, you might get to wondering about how cabbage seed is secured. It has been said that one method is to eat the cabbage and, if it tastes particularly good, to go about collecting the seed. This is near the truth. For it is possible to select seed from the best tasting cabbage if both the head and the stump from which it came are identified by tags.

Cabbage stumps selected for seed production should be overwintered and the following Spring set out in the garden. If carefully tended the stumps will grow and later in the season, instead of heading will bolt—that is, send up tall shoots upon which the four-petalled flowers will later give way to the seed pods. Any leaf of the cabbage will grow provided a piece of the stem is attached and that it has been overwintered and meets the Spring in a green, healthy condition.

In some of the great centers of cabbage seed production it is customary to select the heads, cut them off with a piece of the stem attached and winter them in trenches. The following Spring, the heads are planted in a specially prepared garden where they send out large adventitious roots. The plants, using the nourishment stored in the head, bolt and run to seed.

And with the cabbages safely stored away you will have found that few garden vegetables can give you quite the same feeling of pride that the successful growing of a few dozen head of fine cabbage. To a few cents worth of seed you have added your own work and not a little skill. In return you have produced something worth while and in the doing of it have gained much true satisfaction.

Wet Soil

It is important not to work soil when it is too wet. Mould a ball of earth in your hand, and pat in to make a mud pie. If the pie holds together the soil is too wet to spade; if it crumbles, then you can work it.—*Newark* (N.J.) *Call*

Plant Debris

Never spade leaves or any similiar plant debris into the soil; it takes more than a year for them to decay, and undecayed material in the soil is bad for your plants, and worse for you, in sowing and cultivating. It is better to strip sod and pile it up to decay. When it is reduced to humus it will benefit the garden. Pieces of wood, stones and all other foreign material should be removed from the soil.—*Newark* (N.J.) *Call*

Are Chemical Fertilizers Factors for Undermining Our Health?

By Charles Gerrish, Sr.

ACCORDING to the latest statistics of the U. S. Public Health Service, a very grave health situation is now facing the people of this country. It is quite evident that cancer, heart disease and diabetes is increasing with terriffic r a p i d i t y throughout the nation. In consequence of it being established, without question or doubt, that certain chemicals can and do provide an incidence for cancer in certain industries, well might we ask these questions: Does the now extensive use of chemical fertilizers have any relation to the increase of cancer, heart disease and diabetes? Do these chemicals—when taken into the food we eat—so weaken the body, that is, reduce our immunity or power of resistance, that such afflictions in many instances are inevitable? Are the foods, grown with these chemical fertilizers, unable to supply sufficient vitamins and minerals to provide the body with sufficient strength to ward off these diseases? And, are such vitamins and minerals contained in food grown under such artificial conditions of proper physiological standard?

It is a well known fact that chemical fertilizers—when used to treat the soil—*will* produce increased crops, but are such foods, when grown under such artificial conditions, really good? Are such artificialy grown foods adequate to meet the necessary requirements for building up in the body an indispensable power of resistance to disease?

Since power of resistance to disease, or, as it is also called, "immunity" to disease, arises out of nutrition, it follows that proper food *is* defensive, while, on the other hand, improper food is *destructive*. Destructive not only to health but to life itself. Food then, that is grown under conditions that are unnatural cannot be adequate for providing chemical elements that are compatable with a normal internal chemistry function.

One canot go into the complex details about these three diseases and their relation to nutrition in such a limited article as this one. But so far as my own personal and private research is concerned, having to do with external causes for cancer, the results therefrom do strongly suggest that the increase of cancer has its roots firmly established in immutable principles that express the fundamental structure of the laws of nature. The increase of cancer, as I have discussed it at length in another article entitled "Cancer Increase and its Relation to Civilization's March of Progress", which I shall release for publication later, has many angles and aspects. But all these angles and aspects point to external causes. The remedy for the causes of cancer is pure and simple. It anticipates the prevention and control of this disease *only* when the public is willing to take into consideration and apply a prophylaxis which demands a radical change in their manner of breeding and living. In this article above named, I have set forth an indictment against various extraneous influences which I have charged as being responsible for the increase of cancer among our people. The evidence is based upon biological and physiological chemistry. It does not justify any belief in any theory that recognizes but one incidence for cancer, unless one would call *the* incidence some i n t e r n a l chemistry change, which, after taking effect in the body, produces cancer cells. B u t, improper food is just one external cause for bringing about a morbid internal chemistry c h a n g e that will produce cancer cells. Food, both animal and vege-

table, produced under artificial, unnatural conditions cannot, on any rule of measure, be made to fit into any health promoting plan, and in my opinion, constitutes one of the extraneous causes or at least influences for promoting cancer increase.

As regard to cancer, the concensus of opinion among our leading authorities is this: "Cancer is not a germ or virus disease". In other words, it is not something that is "catching." In other words, one cannot give it to somebody else as one may transmit to others a communicable disease in which the incidence arises out of germs or virus. There are many "authorities" who contend that cancer "is not caused by any type of diet or by the lack of any chemical substance, vitamin or hormone". This, however, is rather a too inclusive statement. To me, at least, it attempts to cover a whole lot of too much territory. It smacks more of hearsay, rather than of scientific investigation. My own experience has demonstrated that various types of diet have positive reactions within the human body and do affect internal chemistry both under normal and pathological conditions; and knowing full well the effects of certain chemicals upon both normal and morbid tissue, I am satisfied that the various types of diet indulged in by the American people have hidden in the kind and quality of food they consume, influences which do promote causes for certain non-contagious diseases; among them cancer, heart disease and diabetes.

It is quite apparent and, as science has demonstrated, some cancers are induced by "chronic irritation". Let us pause here—and consider how the chemicals, in ordinary commercial fertilizer, might set up in the body various forms of "chronic irritation".

Experience, has shown that there is a close relationship between "irritation" in the human body and chemicals. For example: authorities agree that the chemicals used in the dye industry are responsible for certain forms of bladder cancer. Not only that, but certain types of lung cancer are directly attributable to "dust" when absorbed into the lungs of miners. Likewise, the scrotal cancer of chimney sweeps, the skin cancers of tar workers, the bucal cavity (cheek) cancers of "betel nut chewers", the lip cancers of pipe smokers are just a few conditions where cancer has been brought about by "irritation". Thus these chemicals brought about a change in the cells of the body, that is, a change in certain cells. These changes developed into malignant growths—cancers.

Carrying this further: let us reach a logical answer for our question as to what part chemical fertilizers may play in the health of the American people. If chemicals used in certain industries are known to cause cancer—and certain workers employed in these industries can become afflicted with cancer as the result of their contact with certain chemicals—then it is not illogical to offer the proposition that the universal use of chemical fertilizers may be a vital, contributing cause for many types of the malignant ailment usually diagnosed as cancer. At least it is certainly worth a closer investigation than has so far been given it.

Some authorities believe that cancer is produced by a "mysterious incidence". That is, *one cause only* and, yet, an unknown cause. It seems logical to assume then, under such a supposition, that much of the "mystery" continues to remain hidden from view because cancer research is too intensified with trying to locate some ONE particular incidence with which to blame the entire "homogeneous group" of carcinomas. On the other hand, it becomes quite apparent that there is a line of cleavage between cancers that are believed to belong to one homogeneous group of malignant growths. The fact remains, however. that before becoming diseased, the cells that are recognized as cancer cells were once normal cells. They once functioned as normal cells. Since it is generally conceded that cancer in not a germ or virus disease, the logical theory relating to the for-

mation of cancerous growths in the body would be this: Improper or faulty nourishment in the body (call it metabolism, if you wish) can and does cause a change in certain types of healthy cells. Also, improper or faulty nourishment disorganizes the function of the body tissues, the colloids and nerve centers. It interferes with normal oxidation. This in turn reacts with injurious effect upon such tissues or organs which may, for one reason or another, have lost their power of resistance, thus they become susceptible to disease, including cancer, diabetes and heart afflictions.

This being tue, it is then, within the bounds of reason to suspect that certain chemicals which enter the system can interfere with the normal functioning of the digestive system and can reduce the body's ability to fight off disease conditions. When such conditions exist they bring about or cause changes in normal cells that eventually develop into serious ailments.

Now regardless of the fact that millions of people in this country are eating food that *is* deficient in many nourishing qualities—food that lacks proper vitamins or a sufficient amount of vitamins; or food that has been grown by means of artificial fertilizers; and regardless of the fact that only a very small percentage of such under-nourished, chemically-impregnated persons will eventually develop cancer, heart disease or diabetes, it is positive that the "secondary cause" will be due to an interrupted and abnormal internal chemistry function and that the primary cause will be something of an external nature. That small and ever growing per cent who will actually succumb, will have had their immunity so weakened that their bodies could no longer hold their diseased conditions at bay.

There is only one gospel of good health and nine-tenths of it is concerned with nutrition. I believe that folks who grow food under natural conditions are promoting health, and I *know* that those who eat food grown under such natural conditions do go a long way towards building up in their bodies a disease-resisting influence.

It may be inferred, if this article is not carefully read, that I have stated that chemicals are the sole cause of cancer, heart disease and diabetes. Such an impression would be wrong. It might also be asked: just what have chemicals to do with the development of heart disease? Now, it is not my intention here to go into all these points which I have covered in another and more thorough article, as above mentioned. But by way of refutation of any idea that chemicals are only in a small way responsible for such serious diseases as cancer, heart disease and diabetes, let me say that often acute "heart attacks" are due to a condition known as "thrombosis"—which, when analyzed, is purely a chemical reaction. Not only that, but many cases of "acute indigestion" so simulate an attack of thrombosis that the two conditions—both due to chemical reactions—may be confused. And also, it is well known and, which I point out, that when a person suffers with "arterio-sclerosis" or, "splanchnic arteriosclerosis," it is not unusual to find present in the arteries, a waxy substance. The formation of this waxy substance is believed to be formed as the result of a faulty internal chemistry and provoked by toxic conditions arising out of the digestive system. Certainly then, *we are* faced with problems of "chemicals" when such diseases occur. As for cancer, autopsies are constantly revealing that the invarible site of its beginning lies in the digestive tract—"from end to end."

Orchard Mulching

By J. K. Shaw

THE RURAL NEW YORKER (N. Y. C.)

TREES grow naturally in forests. They grow close together and their crowns form a more or less dense canopy above the earth. The soil beneath is covered with a layer of leaves and other organic matter in a more or less decayed condition. This layer and the surface soil is filled with small roots. If the surface layer is removed or destroyed by fire, the trees suffer.

Now it would be foolish to argue that fruit trees should be grown in the same manner as forest trees. For one thing, we grow forest trees mainly for long straight trunks, while we want no more top than is required to produce a desirable trunk. We grow fruit trees with a directly contrary purpose; we want only enough trunk to support the crown which we desire to be large to produce as many fruits as possible. Many years ago, I saw a forest of apple trees planted a few feet apart with bare crooked trunks twenty or thirty feet high. It did not look at all like a profitable orchard. Many orchards do bear a slight resemblance to this apple forest. The trees are too close together. Within reasonable limits, an acre of land can produce only about so many apples, no matter how many trees are on it. "Within reasonable limits" means that tips of branches of adjacent trees do not interlace nor is there more than a few feet between them. Of course, some acres can produce more than others, and lack of proper care will reduce and even ruin production.

Forest Floors

The nature of the forest floor, however, does give us a hint as to conditions that fruit trees like. A ground cover of decaying organic matter seems to furnish ideal conditions for fruit as well as for forest trees. While the forest can itself produce the necessary organic matter, the orchard cannot do so. It is necessary to grow at least a part of the required material outside the orchard and bring it in among the trees.

All this is a round about way of introducing the subject of growing orchards on the mulching system, an orchard practice that is gaining favor wherever it has been tried. Of course, mulching orchards is really not new; it has been practiced in occasional orchards for many years. Maintenance of organic matter in orchards has long been a problem that has been met in various ways. The use of manure, growing cover crops among the trees and sod mulch have been the common methods of keeping up the supply of organic matter in orchard soils. It has long been felt that all these methods fall short of perfection. None produce a ground cover like that in the forest. The soil beneath and between the trees of a mature bearing orchard will not produce enough organic matter to meet the needs of the trees. Sufficient stable manure is not obtainable. Hence, the practice of bringing waste hay of low feeding value, straw and other organic matter from various sources.

Waste Hay Mulch

Experiments in mulching were begun at the Massachusetts Experiment Station 20 years ago. Waste hay was brought into two small orchards and spread around 10-year-old Wealthy and McIntosh trees at the rate of about six or eight tons per acre annually. This is probably more than was necessary. None has been added for the past three years, yet there is a layer of mulch eight or ten inches deep with witch grass hiding the mulch completely. No fertilizer (other than that in the hay) has been applied during the 20-year period. It was two or three years before the beneficial effect of the mulch appeared. Since then, the trees have grown well and produced very satisfactory crops. Beneath the mulch is a layer of

humus with numerous small rootlets running through the surface soil. Five years ago, we mulched another cultivated plot of ten McIntosh trees that had not been fertilized for 17 years and were in poor condition and bearing light crops. This mulch was less in amount and was applied to the bare soil instead of on sod, as in the earlier orchard. The response of the trees was immediate and most satisfactory. Growth was vigorous and crops were good. Rootlets appeared in the surface soil during the second year.

We have found extraordinarily high nitrates and abundant available potash under mulch, yet these trees were not over vegetative and bore large crops of well-colored apples. Pre-harvest drop was larger than in adjoining plots in cultivation, yet more apples were picked from the trees. However, in our experience, bearing orchards heavily mulched with waste hay, without other fertilizer, may become over vigorous.

There are several reasons for the excellent effects of the mulch. The rainfall is all absorbed by the soil and evaporation is less, making a more abundant and constant water supply for the trees. The soil is cooler in Summer and warmer in Winter than under cultivation or sod, which may or may not influence performance. The supply of nitrates and available potash is high. This may also be true for phosphorus and other mineral nutrients in the soil. The mulch may supply minor elements lacking in commercial fertilizers and now believed to be necessary for good growth and production. The aeration of the surface soil, which we believe to be of great benefit to the trees, is better than under other systems of culture. The feeding rootlets attracted by favorable conditions, penetrate this surface layer and absorb mineral nutrients released from the organic matter before they are fixed in the soil. This does not interfere with root development in the deeper layers of the soil where the water supply is more constant. Soil erosion is prevented, retaining the best of the soil and its mineral nutrients.

Mulching Materials

The practice of bringing mulch into the orchard is increasing among practical growers. It has been tried with good results by several experiment stations, especially those of Ohio and Indiana. It seems to be good over a wide range of soils and with all tree and bush fruits. All sorts of materials have been tried, but waste hay that has a low feeding value for animals has been most used. Straw has been tried with good results, but is more likely to call for supplemented applications of fertilizer because straw has a lower content of fertilizer elements than waste hay.

W. B. Farmer, of Hampton Falls, New Hampshire, a farmer in fact as well as in name, has for years brought into his orchard immense quantities of sea weed from the nearby ocean shore. This supplies considerable quantities of potassium, magnesium and other mineral nutrients which benefit the trees. His results have been excellent. Many New England fruit growers have used shredded banana stems from the Boston importers with good results. Both these materials decay quickly and release the nutrients they contain.

But such materials are not generally available and the eastern fruit grower must depend largely on hay, or some similar material that can be produced conveniently and cheaply. There is some question whether the ideal mulching material should be one that decays quickly or one that is resistant to decay. Investigators in the United States Department of Agriculture are experimenting with numerous grasses not now commonly grown. They may find among these grasses something that is especially suitable for mulching, but at present it is known that any of the commonly grown grasses are satisfactory.

There are many orchards in New England and probably elsewhere, which are on soils that are too shallow for best performance of the trees. The

owner would be better off if he removed the trees on these poor soils and devoted the land to growing hay that could be carried in among the trees on better soils. Such poor orchard soils, if not subject to drought, may be quite satisfactory for growing hay.

The benefits of a mulch application will last for several years while direct fertilization is a year to year proposition. Mulching is like putting a part of your income in the bank. A mulch crop may be harvested over a considerable period of time, but it would seem best to do it when the dry matter and mineral content of the crop is at the maximum. If fertilizer is necessary for a heavy mulch crop, we should seek to conserve all of it for the orchard.

Mulching Methods

If one is to undertake growing a crop for the express purpose of mulching orchards, the question arises, "What crop shall I grow?" No specific recommendations can be made, but it seems that the basic principle should be to grow the crop that will yield the most dry matter at the lowest cost. This must mean a more or less permanent seeding rather than a crop that would require annual plowing and reseeding. An established sod can be maintained with moderate fertilizer applications for many years, varying with the crop and soil. The only annual production costs are for harvesting and moving the material, and for fertilizers when they are needed to maintain satisfactory yields. An acre of mature bearing orchard will require about another acre of land for growing the mulch. With younger orchards, a smaller area will suffice. Enough material can be produced for the first five years between the rows and placed around the trees. The mulch should extend a little farther out than the branches, but not close to the trunk. The mulch will atract mice which may girdle the trees, but it also furnishes an excellent opportunity to poison the mice, as should be done in every orchard. If a space close to the trunk is kept clean in the Fall, mice will hesitate to cross it.

Sterilizing Soil

By J. I. Rodale

WE do not hold ourselves out as being agricultural experts but certain things seem to violate fundamental rules of nature and it takes just the simplest kind of common sense to get wise to these things. One of these is soilless gardening. We discussed this question some time back and will no doubt do so again some time in the future. Perhaps when our laboratory is functioning we will test products raised by this method for vitamins and minerals. At any rate we are against it unconditionally as far as raising food is concerned.

There seems to be a growing popularity for sterilizing or baking soil in an oven before using it to prepare seedlings grown indoors. It is just a hunch with me that this is a wrong practice. I believe that if soil is rich in compost, Nature will protect the seedlings and will thank you not to interfere.

Cynthia Westcott, writes beautifully in the Sunday New York Times garden page of Feb. 14, 1943, of the soil's microbiology and I am going to quote her:

"Most people, including beginning gardeners, think of a lump of earth as an inert mass. The green-thumb gardener knows instinctively that soil is a living, sentient thing, but only the soil microbiologist, who sees with the eyes of a microscope, is fully aware of the enormous population and intense activity of the

subterranean world. In one gram of soil—less than a teaspoonful—there may be more than a billion bacteria, several million yeasts, thousands of fungi and algae and more thousands of small animals such as protozoa and nematodes.

"Most of these organisms are beneficial. They break down organic matter, they form nitrites and nitrates, they oxidize sulphur and iron, they destroy other harmful organisms. A complete sterilization of soil, halting all life processes, would be disastrous. The proportionately few microorganisms pathogenic to higher plants should be taken care of by partial soil or seed disinfection, by changing soil reaction (acidity or alkalinity) or by starving out the pathogenes through long crop rotations.

"In applying control measures the gardener must work with nature rather than against her. He should know the exact meaning of the disease threatening his vegetables, and what the chemical he plans to use will do to his soil. Otherwise he may be killing most of the useful law-abiding soil citizens in order to get rid of one or two gangsters."

She gives a graphic picture of the bacterial life of the soil, but errs in suggesting that chemicals be used. Chemicals may cure one condition but create far more serious ones. We shall write to Cynthia. But we do like the part where she says that in order to kill one or two soil gangsters we may destroy other important law-abiding soil citizens. Applying destructive heat to earth is a questionable practice in our opinion, and is one worth watching. Grow seedlings that are nurtured in good, compost-filled earth, without coddling, and let them stand on their own legs.

With Sir Albert Howard

Sir Albert Howard

Dear Sir Albert: I have read a statement recently that finely cut garbage may be used as a fertilizer. *What would be your opinion of this?*

Answer

The statement that finely cut garbage may be used as a fertilizer is not complete. The finely cut garbage ought to be fermented and put through a compost heap before it is put on the land, otherwise it acts like green manure and often reduces the crop rather than improves it.

Question

You may be interested to know that we are arranging to send a five ton dump truck every day to a near-by town and we are going to pick up by-product materials from fish stores and especially butcher shops dealing exclusively with chickens. The chicken material includes feather and cuttings from the chickens as well as a lot of the chicken droppings, which are scraped out of their cages. We intend to compost all of this material.

In connection with the chicken material, I believe that half of the chickens around here are diseased and I believe that composting will kill all of the bad bacteria from the diseased condition.

If you have any special way in mind of composting such material, please advise.

Answer

I think your idea of collecting five tons of various wastes every day is an excellent one. All the materials you mention will be very useful for mixing with vegetable wastes and, provided the process is properly carried out, you need have no fear whatever about disease. I shall be very glad to hear what results you get; no doubt you will print them in *Organic Gardening*.

Communication From Sir Albert Howard

Extract from *Men and the Fields,* by Adrian Bell... Chapter XIV, pp. 143 and 144.

I found a man over seventy cutting up a fallen tree . . . He used a curious phrase to justify the conditions under which the men of his father's generation had worked. 'Well, they had their life,' he said; 'Mind you, I couldn't work to-day like they worked—not if I was young. I couldn't work like I worked as a young man. The bread to-day hasn't got the stay in it. I know, because I've worked on it. When I used to go to work and we baked at home, when I'd had my breakfast that'd stay by me to dinner-time. But when we took to bakers bread, why, after you'd worked for an hour that'd be gone and you'd feel faint inside.'

He had further ideas about food. 'If people ate more of what's grown with m u c k, there'd not be half the illness about. People say that what's grown with artificial manure does you as much good as what's grown with muck. But I know that's wrong. What's grown with chemicals m a y look all right, but it ain't got the stay in it.'

Trenching

The trench method you describe in your letter under reply will work very well. Another method of doing the same thing is referred to in my book, *An Agricultural Testament,* on page 240, under the heading "Composting Night-soil and Town Wastes in Small Pits." *This method is now used in trenches in this country with good effect, particularly with vegetable wastes.* The bottom of the trench has a layer of vegetable waste, then a layer of farm yard manure, covered with a second layer of town wastes. The trench is then filled with soil and natural composting takes place in time for the spring growth of the vegetables. *The great thing in this sort of composting is not to add too much soil which cuts off the air supply. There must be plenty of air for the trench, otherwise the organisms cannot work.*

Yours sincerely,

A Howard.

Question

How can some of the labor in making compost heaps be eliminated?

Answer

This can be done by greater care in the original mixture. If great care is taken in assembling a heap which, we will say, finally settles to a height of about 4 feet, turning could be avoided if the upper 2 feet were used first and the lower portion used after an interval, because my experience always has been that it is the portion of the heap nearest the atmosphere which ripens first, because air will percolate into a fermenting heap to a depth of about 18 to 24 inches quite easily. The result is the upper portion is ready, but the lower portion is not, so that if the upper portion is shovelled off first and the lower portion is left for another month, we might get very useful results in this way.

* * *

Labor can be saved in compost making by a careful assembly and mixing of the materials. In this connection you will be interested to know that as the soil becomes fertile its digestive power as regards organic wastes laid on the surface increases very rapidly; a time comes when a fertile soil will eat anything when spread on the surface.

What I meant about mixing the materials as they go into the heap is this: instead of sandwiching them and keeping the soil, vegetable wastes and animal wastes separated, to mix them as one goes on, so to speak. It can easily be done in this way. If we start with a six-inch layer of vegetable wastes, put on a two-inch layer of farm yard manure, and a sprinkling of earth, and then fork up the layers, they get mixed quite a lot and fermentation is very much better and more complete than if the material is left as separate layers. By doing this we need only turn once. In fact, when the New Zealand box is used, if we mix the material in the box, as I have suggested, all that is

needed is to turn out this material into another empty box by the side and let the fermentation complete itself in the second box; then no more manipulation is necessary.

Question

As an experiment, we intend to apply a deep hay or straw mulch on ten acres on which corn is to be planted in the spring. The mulch will remain on the land for about seven or eight months and then plowed under. What is your opinion?

Answer

With regard to your treating an area destined for maize (corn) with vegetable wastes, the results will depend on the fertility of the soil; as your land becomes very rich in humus you will find that it has the capacity of eating up almost any vegetable wastes when laid on the surface, but if your land is not fertile the best results are obtained by spreading farm yard manure or compost on the top of the wastes and ploughing the two in together, or even leaving the mixture on the surface. A good deal of work in this direction has been done by some of the planters in Kenya, one of whom wrote to me some time ago that he had got his plantation so fertile the soil would eat almost anything thrown at it from a gunny-bag to maize stover.

Compost Department

Question: *Can I use coal ashes in a compost heap? I understand they contain valuable minerals.*

Answer: They do contain minerals—but of the wrong kind and strength. In the average coal ashes you will find high sulphur compounds that may poison your plants. Incidentally, the railroads strew ashes along their rights-of-way to *destroy* vegetation. So do not use coal ashes in your compost heap. Wood ashes, however, are splendid additions and may be used in the place of lime in compost heaps.

Question: *How can I make up my compost heap during the winter time? I would like to use a certain amount of kitchen waste.*

Answer: Here in the North the ground is too frozen to obtain the necessary amount of earth. But this condition can be overcome by storing a certain amount of earth under a shed in warm weather, to be used during the winter. This earth pile should be protected by a thick covering of straw to prevent freezing—and should be kept covered during use.

Question: *My compost pile gives forth a bad odor. What causes it?*

Answer: There should be no disagreeable odor from a compost pile. The disagreeable odor means that the wrong kind of decomposition is progressing. Sir Albert Howard has shown, in past writings, that where a compost pile gives off an unpleasant odor it should be torn apart and reconstructed. When you do this, however, sprinkle in a little more lime.

Question: *Is charcoal suitable for compost heaps?*

Answer: Charcoal is not suitable. It was formerly an organic substance but in the charred form this wood is dead. The bacteria have a most difficult time with it. Scientists have proved that a piece of properly charred wood is often capable of withstanding decay for centuries. Do not use charcoal.

The following question on earthworm eggs was submitted

to Dr. Ehrenfried Pfeiffer who submitted the answer:

Question: I would like to know something about earthworm eggs and what they are like. When I turned the compost heap over, that I made this fall, I noticed quite a few whitish eggs a little over 1/8 of an inch long, in one part of the heap?

G. R. B., Calgary, Canada.

Answer: The whittish eggs are larvae from flies. The earthworm egg is really not an egg, but an oval—yellow—gelatinous capsule, containing 6 to 12 microscopic earthworms. It is usually about 1/8 of an inch in diameter.

Miscellaneous Items

Compost Water

Start your seeds sprouting indoors immediately. Any warm place will do—the kitchen, for example. Sprouting seeds need no sunlight—only moisture and warmth. Try moistening these seeds—and later, the seedlings, with compost water. Fill a milk bottle or jar with compost, pour in as much water as possible and use this water for moistening seeds and seedlings. You'll be surprised with the results. When the jar is empty of water—pour in some more. Use the compost over and over again but occasionally add a little new compost to strengthen the solution.

Chemical Fertilizers

When inorganic or chemical fertilizers are used some acid residues are left. For example, the ammonia is extracted from sulfate of ammonia, and sulfuric acid remains; or the potassium is removed from chloride of potash, and hydro-chloric acid remains.—*The Home Garden* (N. Y.).

Carrots

A farmer who has often failed to get a good stand of carrots asked a neighbor always successful, "How do you do it?" "Simple!" said the neighbor. "I plant shallow in moist soil by hand, mixing about 1/4 radish seed of 'small round' to the carrot seed; they 'break the crust' ". Also, a Dutch lady, who gets fine stands during the worst drouth years, soaks the bottoms of shallow furrows, then covers with fine soil.—*Eugene Middleton.*

Potatoes

Boy Pye, an Englishman, originally, declares that small whole potatoes, selected from particularly productive hills, will outdo others planted the usual way, and he declares he has strikingly proven it by growing such potatoes alongside of the rows planted by skeptics in the usual way.—*Eugene Middleton.*

Bonfires

Under no circumstances, should you permit a bonfire to be built upon the spot where your garden is to be made this coming spring. If you do, you might just as well discard that particular plot, where the fire has burned, and eliminate it from all your possible crop calculations this coming fall. A bonfire on your land not only destroys the earthworms for some distance around it but it also wipes out the helpful bacteria that must be alive, and functioning, if your plants are to take up suitable nourishment from the soil. Make the rule "no bonfires" and stick to it.

Reader's Correspondence

Feb. 10, 1943.
Organic Gardening.

Your article on Kitchen Waste and Trenching for the Home Garden lays out a very practical way to build up the garden soil near the house.

But towards the end you say to keep the garbage in a large can until burying. The action of the fermenting garbage in contact with the metal can and oxygen, at once starts to form ptomaine poison. In the case of vegetables raised where this ptomaine-garbage is used, there has been little research that I know about. But here in California, if garbage from a can is used to fertilize Avocado or Citrus trees, the pomaine at once reaches the fruit.

A noted Los Angeles specialist noticed that his stomach-ulcer patients largely came from the suburbs. To make it short, he found ptomaine in their home raised fruit and traced it to garbage being buried around the trees, on week-ends etc. Avocadoes seemed to be the worst poison collector. Then Oranges and Grapefruit. When last I talked with him about it, he had no information ready concerning other fruits or vegetables.

I am taking the liberty to bring this to your attention because I feel sure it is true. Many times presents of avocadoes or citrus fruit brought me indigestion. Lately, upon inquiring, find garbage had been used around the trees. On the other hand, orchard raised Avocadoes and Citrus Fruit are among our most health-giving fruits.

Yours very truly
Ralph W. Sorin
Ramona, Calif.

Answer

Mr. Sorin states "he found ptomaine in their home raised fruit and traced it to garbage being buried around the trees." This is contrary to the methods we advocate. According to the Howard method, garbage should be composted first, and never used on the land in its raw state. Even manure should not be used in its raw state but should be placed in compost heaps. In this very issue Sir Albert Howard shows that even where diseased tomato plants were composted and used on the land, a healthy crop followed. The heat of the compost heaps kills off dangerous organisms.

Along the same lines, we stated in our article on trenching that before planting in the places where the kitchen wastes were placed, it must first be ascertained that the garbage has thoroughly decayed or trouble will ensue. Dr. Ehrenfreid Pfeiffer in this connection passed on the soundness of trenching garbage but cautioned about not planting in partially decayed garbage. It must be absolutely broken down. He stated that in Europe there were cases of sickness where food was raised in garbage that was not thoroughly composted.

Now regarding storing garbage in metal containers there is a question whether that would make much difference, as far as oxygen entering into a chemical action is concerned. The doctor no doubt jumped to his conclusion, not knowing the fact that composting garbage would make all the difference in the world. However, it is a point worth checking by experiments. For storing large quantities of garbage we have suggested that cement lined pits would be very practical. This subject is in its infancy and time will produce the correct answer.

* * *

To Dr. Ehrenfried Pfeiffer
Kimberton Farms,
Phoenixville, Penna.
January 26, 1943

There has lately been brought to our attention, a form of agricultural lime, known as agricultural magnesium carbonate with a dry chemical analysis of 54% calcium carbonate and 43% magnesium carbonate. This material is obtainable through

the Bethlehem Steel Co. They state: "This combination of plant foods is more effectual in neutralizing soil acids than the purest commercial calcium carbonate obtainable (lime)."

Will you kindly let us know what you think of this lime and whether the magnesium carbonate is too strong for use on the land, from the organic point of view.

Answer

This form of agricultural lime you refer to is known as Dolomite and is considered to be better balanced than limestone alone. It is gradually absorbed by the soil and is less likely to be washed away than ordinary lime.

* * *

From Henry C. Hass,
New York City
January 21, 1943.

Enclosed are two copies of "Timely Tidings" for January, 1943. You will find on page 3 an article quoting your magazine. I do not believe a better way could have been found to put a little guilt into the minds of hundreds of my neighbors who have been burning every fall nearly all the leaves that come down from the many hundreds of trees in Arthur Manor. Not only that, but tons of garbage and much of the plant refuse, which falls to the ground when freezing starts in the hundreds of Arthur Manor gardens, are carted away by the Village of Scarsdale. I believe they make fertilizer of this in some way. I think it will be fine if I can get an accurate description of what the village does with garbage and vegetable refuse and send it to you.

The "Scarsdale Inquirer," the only large newspaper printed in Scarsdale, published a formula for compost some years ago—it was this:

100 p o u n d s "compost" (vegetable refuse).
1 pound ground limestone.
2 pounds ammonium sulphate.
4 pounds super phosphate.

I am wondering if making humus by the method Sir Albert Howard advocates could not be made a community measure. The pile could be made a full acre in extent, placed where it could not offend, covered with carefully designed awnings to keep off or admit the rain at will, and carefully tended.

That is food for thought.

Answer

Your suggestion that you will try to get some accurate information as to just what becomes of the street refuse—the leaves, etc.,—collected by Arthur Manor sounds most interesting. Such information might be made the subject of a rather enlightening article in some future number of Organic Gardening.

The formula for compost that was printed in the "Scarsdale Inquirer" contains a serious joker—that 2 pounds of ammonium sulphate. Ammonium sulphate is death to earthworms—could we s a y more? To get natural compost no chemicals should be added. Lime or wood ashes, however, should be used. Lime is really a form of earth.

Your remarks about community compost piles shows that instinctively you lean in the right direction—community compost piles have been made in India for many, many centuries. They have proved outstanding successes.

* * *

From Irving Shapiro
Far Rockaway, New York
January 27, 1943.

Under separate cover, I am sending sections of grass from a salt swamp. How long would it take these to decay into humus?

Answer

Your letter has come to hand with the enclosures of two different kinds of material you call salt grass which in reality is a form of woody, swamp reed. You ask if these would do well in a compost heap. The answer to that is: sea weed has worked out splendidly as a fertilizer. It is being used in England and on the continent of Europe.

It is put into the soil without any preparation whatsoever. The mineral content of seaweed is very high—especially iodine. The chances are that the samples of the salt grass you submitted is very high in such minerals—far more than ordinary leaves, straw etc. In the tropics the cocoanut, which grows with its roots on salt water, is especially rich in minerals.

Now, as to the practical use of this swamp reed in compost heaps. We must not overlook the fact that the stems of this reed are tough—very tough. They seem to be harder than corn-stalks. And corn-stalks present a difficult problem for compost heaps. Therefore, these reeds must be broken up. Perhaps you could grind them under the wheels of a truck—or under a lawn roller. Or you could cut them up into small pieces in some machine. When that is done, they should be put into a pile and allowed to remain damp for a month or so, until they become soft. In a soft stage they should work ideally into your compost heap.

Since you are near the ocean, why not collect some seaweed for your compost making? Try it out and keep us informed.

* * *

From Raymond L. West
Santa Aanna, California
January 6, 1943.

I have just read your Nov. issue, and am greatly interested in your article on the dangers of using chemical fertilizers.

I might add that I most heartily agree with you on the dangers of using Chemical fertilizers, but am sorry to see that you cannot get far away from your laboratory yard stick when you add lime to your compost pit.

Answer

Your allusion to the use of lime in the compost heap brings up an interesting point. Now, lime is not a chemical. True, it is used in combination with chemicals in ordinary commercial fertilizers—and we will say that in such instances, it is in mighty bad company. However, that does not change its character. Lime is not a metal—not a stone—it is an alkaline *earth*. And being highly alkaline, it counteracts the action of acids. Now. in ordinary compost heaps—using kitchen waste, stable manure, chicken droppings, etc.,—there is generally a concentration of acid elements not usually found in the woods and meadows where Nature carries on her own composting activities. Therefore, as helpful bacteria—which change the organic material in compost heaps to fertilizer—can only live and work in alkaline surroundings, something must be done to counteract this excess acid condition in your garden compost heap. Sir Albert Howard reports that in India, where composting is carried on by whole communities—the addition of lime to compost heaps is absolutely necessary. This lime, counteracting the acids, permits the bacteria to work faster and thus the "decay" or "change" of the organic material into fertilizer is expedited. Other great bio-chemists advocate the same procedure. But, on the other hand, if you regard lime as a chemical agent, you have at your disposal a very satisfactory substitute—wood ashes. These are alkaline in character. But we, who look upon lime as an alkaline earth, advocate its use in compost heaps merely because it is plentiful and cheap and far easier to obtain, by the average person, than wood ashes.

* * *

From A. T. De La Mare
New York City
January 21, 1943.

I have always been interested in using horse or cow manure together with commercial fertilizers rather than either one alone. Our chief difficulty in the suburbs is in obtaining the manure—that is the fresh manure.

Answer

The matter you bring up about using a combination of commercial fertilizers with cow or horse manure is an in-

teresting one. We all know that the small gardener is faced with a lack of manure of any kind—good fertilizers like the sparrows — seemingly having been abolished with the advent of the automobile. However, on our experimental farm out here in Eastern Pennsylvania we have been experimenting with the use of kitchen waste — ordinary garbage — in some of our compost heaps and the substitution seems — to be satisfactory. Really the only ingredient that the farm manures—horse and cow—seem to furnish to fertilizers are certain types of protein compounds which seem most essential. The average kitchen waste carries with it fairly good supplies of proteins in the shape of meat and fish scraps. Why not try composting—with some kitchen wastes?

* * *

From Chas. F. Johnson
Lebanon, Missouri
December 30, 1942.

I have a compost about like you describe. Would be glad to know how to hasten its decay.

Most of the garden magazines deal with the growing of flowers, and it is vegetables I raise, in fact mostly tomatoes.

But this year I want to raise some new drug crop or possibly tobacco. Have you any suggestions?

Answer

The best method to hasten the decay of a compost pile is to keep it thoroughly damp at all times. A compost pile if made according to the Indore directions should be ready to use within 3 months. This will not be the case if the compost pile is permitted to become too dry. A compost pile should be kept as wet as possible without the water running out from underneath the bottom of the pile.

As to your idea of raising tobacco through the use of compost, let us suggest that we believe you are headed in the right direction. Not long ago the writer of this letter had occasion to talk with one of the greatest bio-chemists in the United States, and he expresses it as his opinion that the only difference between the highest grade Cuban tobacco, and the American grown leaf is the poor fertilizer used in this country. It was his opinion that if a proper compost fertilized plot was made the resulting tobacco would be as fine as the highest grade Havana. He claimed that climate had nothing whatsoever to do with the grades of tobacco.

* * *

Gullies

From Sigmund Sameth
Grandeval Farm
Kutztown, Penna.
January 29, 1943.

I have just bought a 52 acre abandoned farm. Can you suggest some means to stop gullying on my hillsides? In some places the gullies are two feet deep or more, right through the topsoil and down to the sterile reddish subsoil. What will grow fastest and check further washing in these waterways? Is there any vine that will creep down and root in the sterile subsoil and hold it in place?

(The above questions were submitted to Dr. Ehrenfried Pfeiffer, Kimberton Farms, Phoenixville, Penna. who supplied the following:)

Answer

The best covers for gullies are: honeysuckle and kudzu. They grow very abundantly after a while. The most important things to do, however, is to contour plow and to cover the watershed above the gullies and around the sides of the gullies with a permanent grass and clover cover. I would advise a complete soil conservation survey and a study of the literature of the Department of Agriculture on soil conservation, strip farming and gully and erosion control.

* * *

Rototiller

From Hugh S. Behr
401 Broome Street
New York City
January 26, 1943.

Last August I bought a 3½

acre farm and I intend following your method of growing things. I have a Rototiller and expect to experiment the sheet composting method mentioned in December Organic Gardening along with your regular compost method. I noticed a nice compost pile on the place so I feel I will have a fair start in the right direction. I would like to know some time what you think of the Rototiller.

Answer

As to the Rototiller: we have received splendid reports about it. Recently we visited a large farm where only compost was used and where they have a large greenhouse. The keeper of this greenhouse was most enthusiastic about the Rototiller.

* * *

Feb. 18 1943

Last year I placed some meat scraps just under the top surface of a pile I was gradually building. A few days later I lifted this covering to see what had happened, and discovered the scraps alive with maggots. A little "Adco" cleaned up the situation.

Now, does the maggot, which I assume will starve when the meat is gone, perform the same function as the earthworm? Or did I handle the problem incorrectly i. e. no maggots should appear?

Sincerely,
John P. Delano
Waban, Mass.

Answer

The correct procedure in handling meat scraps is to compost it according to the instructions we have given. In other words, the meat scraps may be treated as the equivalent of manure in the compost heap. Where a heap is properly made you will not find any maggots forming. You must be careful to put lime or wood ashes over the meat scraps. We do not recommend the use of any chemicals except lime, which is a form of earth. Dehydrated cow manure may be used in place of fresh manure although it may be somewhat expensive.

Compost for the Garden

(Continued from inside front cover)

ator, consisting of the entrails, head, feet and feathers of chickens and cage scrapings, sawdust, etc., all of which is valuable as a substitute, if not an improvement upon manure. Near our farm which is only about 95 miles from New York City a considerable

STATEMENT OF OWNERSHIP

Management, etc., required by the Act of Congress of August 24, 1912, of ORGANIC GARDENING published 10 times a year at Emmaus, Pa., for January 27th, 1943.

State of Pennsylvania } SS
County of Lehigh }

Before me, a Notary Public in and for the State and County, aforesaid, personally appeared J. I. Rodale, who, having been duly sworn according to law, deposes and says that he is the publisher of ORGANIC GARDENING, and that the following is to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations to wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are, Publisher, J. I. Rodale; Editor, J. I. Rodale; Managing Editor, none.

2. That the owners are: J. I. Rodale and Joseph Rodale.

3. That the known bondholders, mortgagees or other security holders are (none).

J. I. RODALE, Publisher

Sworn to and subscribed before me this 27th day of January, 1943.

ELMER BARTO, Notary Public.

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amount of trapping of small animals is carried out in the winter. After the skins are taken off, the rest of the carcasses are dumped somewhere. This is very valuable material, if composted. It may lead to trouble if used on the land in its raw state. An enterprising person will find available much other material if he keeps his eyes open. It is a wretched crime the way we Americans allow so much valuable material to go to waste. It must amount to millions of dollars of value every year. Some day we are going to wake up when it is seen how our farm lands are running down when the use of such materials could keep the land in excellent fertility.

How to Make The Heap

There need be no fear of putting weeds in the compost heap, even if they are full of weed seeds, and are diseased. The heating, fermenting action of the heap kills the weed seeds and the harmful germs of disease. This is one reason why the use of raw manure is not advisable. It is usually full of weed seeds, and by using it, you are actually planting a crop of weeds. Another reason why the use of raw, uncomposted manure is bad is that it takes much bacterial action in the ground to break down and to rot it. At a time when such bacteria are needed to aid in the growing process of the crop, some of them are being used to break down this raw manure. This is poor military strategy, if we may compare the bacteria in the soil to an army.

Start off by putting a layer of green material about six inches high on the ground, to the width and length that you have chosen for your heap. Better results will be obtained if you can provide for some method of air entering the bottom of the heap, by placing heavy branches of trees on the ground underneath your first layer. Another method would be to build a slatted platform of green material on top of the last layer of earth, then 2 of heavy wood, about six inches off the ground, with the wood spaced an inch or two apart so the air can get up from the bottom.

This first layer of withered green material is placed either on the ground or on the platform. It is then followed by a layer, about 2 or 3 inches thick, either of manure or one of the substitutes such as fish or chicken cuttings, or animal matter taken from your kitchen waste. You then apply a light sprinkling of lime or wood ashes. Be sure that it is agricultural lime and not the stranger lime which is referred to as gypsum. The lime is needed to sweeten the pile, alkalinize it and to hasten decay.

You then apply about one inch of earth, preferably rich earth full of bacteria.

Then you start the process all over again, placing 6 inches

inches of manure, lime and earth. You keep on until the heap reaches a height of five feet. Do not tamp it down as you make it but leave it soft and fluffy so that the air can get into the center of the heap. Keep watering it from time to time so that when it is finished it is damp but not too soggy. The right amount of moisture is very important.

As you construct the heap, let it taper up, so that if it is 6 feet wide at the bottom it would be about 3½ feet wide at the top. Also scoop out the center of the top, saucer fashion, so that the top of the heap will hold as much of the water as possible when it rains. The last layer of manure should be a little thicker than the others and the last layer of earth should also be much heavier and cover the sides as well as the top.

If the weather is wet, you need not water the heap, but it is essential to do so when the weather is dry. Somewhat better results will be obtained if you cover the heap on top and sides with a straw mulch about 6 inches thick. This will prevent the top of the heap drying out when the weather is hot and dry. It will allow the spray of water to reach the heap more uniformly. Without this mulch be careful that you use a fine spray of water on the heap. If you can obtain rain water or water from a pond for spraying so much the better.

When the heap is finished make three holes in the top to allow air to get to different parts of the heap. They should be 5 or 6 inches in diameter and should run from the top to the bottom of the heap in the center of the width of the top. These holes can be made by inserting a crowbar in the heap, a day or two after the heap was completed because by that time the height will naturally come down from five to about two and a half feet. It will thus be much easier to make the holes. A better method is to insert pipes as you are making the heap and to pull them out when it is completed. We use this method on our farm. It produces big, round holes clear down to the bottom. You might use blocks of wood instead of pipes. They may be square or round.

Turning of the Heaps

Three weeks after the heap is completed it is turned so that what was on the outside of the heap goes into the inside. In this manner every bit of material has a chance to undergo the heating, fermenting, decaying action of the inside of the heap, where the bacteria can break it down. Five weeks after the first turn, it is turned again. It is best to use a five prong pitch-fork to make these turns. Four weeks later, or exactly three months after the heap was made, it is ready. It does no harm if it stands a little while after the three month period. In fact in some cases it may take 4 or 5 months for complete decay, due to various factors. It is now humus.

Sir Albert Howard advises that after it is completed that it be applied to the land as soon as possible or placed under cover. If not used for awhile, it should be turned from time to time.

Trenching Finished Humus

An excellent method of using finished compost in the vegetable garden is as follows. Let us say your compost is ready by July. Dig trenches between the rows of your vegetable garden, one foot deep, one shovelful wide. Mix your compost with earth, half and half, using the earth dug out of the trench and place back in trench. Mark off these aisleways so you will know where they are next spring. You will do your next year planting in these aisleways. In this manner, each year you will alternate, one year planting in the rows, the next year in the aisleways. You will get crops such as you have never dreamed possible, with almost complete absence of insects.

AN AGRICULTURAL TESTAMENT

By Sir Albert Howard, C. I. E., M. A.

Formerly Director Institute of Plant Industry Indore, and Agricultural Adviser to Central India and Rajputana.

SIR ALBERT HOWARD C. I. E., M. A.

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